

**CLAIMS**

1. A rigid arm lat pull down machine, comprising:
  - 2 a main frame having a user support pivot mount, a forward end,  
and a rear end;
  - 4 a user support frame pivotally mounted on the user support pivot  
mount for supporting a user in a seated position;
  - 6 a user engagement means movably mounted on the frame for  
movement between a start position located above the head of a user in a  
8 seated position on the user support frame and an end position lower than  
the start position and generally below the user's chin;
  - 10 a connecting linkage connecting movement of the user engagement  
means to movement of the user support frame; and
  - 12 a load for resisting movement of at least one of the moving parts of  
the machine;
  - 14 the combined motion of the user support frame and user  
engagement means between the start and end position substantially  
16 replicating the natural movement of the upper part of the human body  
when performing a free bar chin up exercise.
2. The machine as claimed in claim 1, wherein the user support frame has
  - 2 a start position corresponding to the start position of the user engagement  
means and an end position corresponding to the end position of the user  
4 engagement means, the start position of the user support frame  
comprising a rearwardly reclined position.
3. The machine as claimed in claim 2, wherein the end position of the
  - 2 user support frame is a forwardly inclined position.

2 4. The machine as claimed in claim 2, wherein the end position of the  
user support frame is an upright position.

2 5. The machine as claimed in claim 1, wherein the user engagement  
means is moveably mounted on the frame for rotation about an exercise  
arm pivot.

2 6. The machine as claimed in claim 5, wherein the exercise arm pivot is  
positioned forward of the user support.

2 7. The machine as claimed in claim 5, wherein the exercise arm pivot is  
positioned rearward of the user support.

2 8. The machine as claimed in claim 1, wherein the user support pivot  
mount is positioned at a predetermined location under the user support  
frame and beneath the user's body when supported on the frame, the  
4 pivot mount defining a vertical, gravitational center line, whereby  
movement of the user engagement device in an exercise movement  
6 simultaneously moves the user support frame between a start position  
and an end position, the user support pivot mount being positioned such  
8 that portions of the combined weight of the user and user support frame  
are distributed on each side of the gravitational centerline of the pivot  
10 mount in both the start and end position and only a portion of the  
combined weight passes through the gravitational centerline during the  
12 exercise movement.

2 9. The machine as claimed in claim 1, wherein the user support frame has  
a primary user support and a secondary user support held in fixed relative

4 locations throughout an exercise movement, the primary support  
4 comprising a seat pad.

2 10. The machine as claimed in claim 9, wherein the secondary support  
2 comprises a thigh hold down device.

2 11. The machine as claimed in claim 10, wherein the secondary support  
2 further comprises a back pad.

2 12. The machine as claimed in claim 10, wherein the thigh hold down  
2 device comprises pads.

2 13. The machine as claimed in claim 10, wherein the thigh hold down  
2 device comprises a seat belt.

2 14. The machine as claimed in claim 9, including an additional user  
2 support for supporting a different part of the user's body from the primary  
support and secondary support.

2 15. The machine as claimed in claim 14, wherein the additional user  
2 support is mounted on the user support frame and moves in fixed  
relationship with the primary and secondary supports.

2 16. The machine as claimed in claim 14, wherein the additional user  
2 support is mounted on the main frame and is fixed in position throughout  
an exercise movement.

2 17. The machine as claimed in claim 14, wherein the additional user  
2 support comprises a foot support for the user's feet.

18. The machine as claimed in claim 9, wherein the user support frame  
2 has a base and an upright, the primary user support being mounted on the  
base.

19. The machine as claimed in claim 1, wherein the user support frame  
2 defines an initial position for the user's body when supported on the  
frame in the start position of the exercise, and a finish position for the  
4 user's body in the end position of the exercise, the user support pivot  
mount defining a gravitational centerline extending through the user's  
6 thighs in each of said user positions.

20. The machine as claimed in claim 1, wherein the main frame has a  
2 base and the pivot mount is mounted on the base.

21. The machine as claimed in claim 1, wherein the user support pivot  
2 mount comprises a four bar linkage.

22. The machine as claimed in claim 1, wherein the user engagement  
2 device is movably mounted on the main frame.

23. The machine as claimed in claim 1, wherein the user engagement  
2 device comprises at least one rigid exercise arm.

24. The machine as claimed in claim 1, wherein the user engagement  
2 device comprises a pair of independently movable exercise arms.

25. The machine as claimed in claim 1, wherein the connecting link is a  
2 rigid link.

26. The machine as claimed in claim 25, wherein the connecting link has  
2 a first end pivoted to said user engagement device and a second end  
pivoted to said user support frame.

27. The machine as claimed in claim 1, including a slide member slidably  
2 mounted on said user support frame, the connecting link having an end  
pivoted to said slide member.

28. The machine as claimed in claim 1, wherein the connecting link  
2 comprises a first gear toothed cam mounted on said user engagement  
device, a second gear toothed cam mounted on said user support frame,  
4 and a sprocket rotatably mounted on said frame and meshing with said  
first and second gear toothed cams so as to link movement of said user  
6 engagement device with movement of said user support frame.

29. The machine as claimed in claim 1, wherein the connecting link  
2 comprises a moving wedge member movably engaged with said main  
frame and user support frame, and a connecting member pivotally  
4 connected to said user engagement device and said wedge member.

30. The machine as claimed in claim 1, wherein the load comprises a  
2 selectorized weight stack.

31. The machine as claimed in claim 1, wherein the load comprises  
2 weight plates.

32. The machine as claimed in claim 1, wherein the load is linked to said  
2 user support frame.

2 33. The machine as claimed in claim 1, wherein the load is linked to said user engagement means.

2 34. The machine as claimed in claim 1, wherein the load is linked to said connecting link.

2 35. The machine as claimed in claim 1, wherein the main frame has a base, the user support pivot mount being located on said base, and an upright strut spaced forward of said pivot mount and having an upper  
4 end, the user engaging means comprising an exercise arm pivotally mounted on said upper end of said upright strut and having a first portion  
6 extending from said exercise arm pivot towards the forward end of said frame and a second portion extending towards the rear end of said frame,  
8 and user engaging handles depending downwardly from said second portion above said user support frame for engagement by a user.

2 36. The machine as claimed in claim 35, further comprising a counterweight secured to the first portion of said exercise arm.

2 37. The machine as claimed in claim 36, wherein said load comprises a weight stack, said frame having a weight stack housing containing said weight stack and extending upwardly at the forward end of said frame,  
4 said counterweight being located above said weight stack housing.

2 38. The machine as claimed in claim 36, including a slide member slidably mounted on said upright strut, said connecting link comprising a first linkage connected between said user support frame and said slide

4 member, and a second linkage connected between said counterweight and  
said slide member.

39. The machine as claimed in claim 1, wherein said connecting link  
2 comprises a cable and pulley linkage between said exercise arm and said  
user support frame.

40. The machine as claimed in claim 35, wherein said connecting link  
2 comprises an elongate member having a first end pivotally secured to said  
exercise arm and a second end pivotally secured to said user support  
4 frame.

41. The machine as claimed in claim 35, wherein said connecting link is  
2 adjustable in length.

42. The machine as claimed in claim 35, wherein the load comprises a  
2 plurality of weight plates selectably mountable on the first portion of said  
exercise arm.

43. The machine as claimed in claim 1, wherein the main frame has a  
2 base, the user support pivot mount being located on said base, and an  
upright strut spaced forward of said pivot mount, the user engaging  
4 means comprising an exercise arm movably mounted on said upright strut  
for linear motion along said strut, the exercise arm projecting rearwardly  
6 from said upright strut above said user support frame, and having a  
downwardly depending handle for gripping by a user.

44. The machine as claimed in claim 1, wherein the main frame has a  
2 base, the user support pivot mount being located on said base, an upright

strut spaced rearward of said user support pivot mount, and said user  
4 support means comprising an exercise arm pivotally mounted on said  
upright strut for rotation about an exercise arm pivot, and having opposite  
6 arm portions extending forward from said exercise arm pivot on opposite  
sides of said user support frame, said opposite arm portions being located  
8 above a user seated on said user support frame in said exercise start  
position.

45. A lat pull down exercise machine for performing an exercise  
2 equivalent to a free bar chin up exercise, comprising:  
a main frame having a forward end and a rear end;  
4 a user support pivot mount on the main frame;  
a user support frame pivotally mounted on the user support pivot  
6 mount, the pivot mount defining a vertical, gravitational center line of the  
pivotal movement, the user support frame comprising one moving part of  
8 the machine;  
an exercise arm movably mounted on one of the frames for  
10 engagement by the user in performing exercises, the exercise arm having  
a user engaging portion, and comprising a second moving part of the  
12 machine;  
a connecting link movably engaged with at least two of the main  
14 frame, user support frame and exercise arm for linking movement of the  
exercise arm to movement of the user support frame, the connecting link  
16 comprising a third moving part of the machine; and  
a load for resisting movement of at least one of the moving parts of  
18 the machine;  
the combined motion of the user support frame and user  
20 engagement means between the start and end position substantially

22 replicating the natural movement of the upper part of the human body  
when performing a free bar chin up exercise.

2 46. The machine as claimed in claim 45, wherein the user support pivot  
mount is positioned at a predetermined location under the user support  
4 frame and beneath the user's body when supported on the frame, such  
that portions of the combined weight of the user and user support frame  
6 are distributed on each side of the gravitational centerline of the pivot  
mount throughout the entire exercise movement between the start and  
8 end position, only a portion of the combined weight passing through the  
gravitational centerline during the exercise movement.

2 47. The machine as claimed in claim 45, wherein the exercise arm and  
user support frame are positioned relative to one another in the start  
position such that the user engaging portion is located above the head of  
4 a user seated on the user support frame whereby the user can grip the  
user engaging portion with their arms extending straight above their head  
6 and in line with the side centerline of their body, and are positioned  
relative to one another in the end position such that the user engaging  
8 portion is located below the chin and in front of the user's shoulders.

2 48. The machine as claimed in claim 45, wherein the user support frame  
is in a rearwardly reclined orientation in the start position.

2 49. The machine as claimed in claim 48, wherein the user support frame  
is in a forwardly inclined orientation in the end position.

2 50. The machine as claimed in claim 48, wherein the user support frame  
is in an upright orientation in the end position.

4 51. The machine as claimed in claim 45, wherein the exercise arm is movably mounted on the main frame.

2 52. The machine as claimed in claim 51, wherein the exercise arm is slidably mounted on the main frame.

2 53. The machine as claimed in claim 51, wherein the exercise arm is pivotally mounted on the main frame.

2 54. The machine as claimed in claim 53, wherein the exercise arm is pivotally mounted on the main frame for rotation about an exercise arm pivot axis at a location spaced above the user support frame.

2 55. The machine as claimed in claim 54, wherein the exercise arm pivot axis is spaced forward from the user support pivot mount.

2 56. The machine as claimed in claim 53, wherein the exercise arm is pivotally mounted on the main frame for rotation about a pivot axis spaced behind the user support frame and user support pivot mount, and  
4 has handle arms extending forward from the pivot axis on each side of the user support frame, the handle arms being spaced above the user support  
6 frame in the start position.